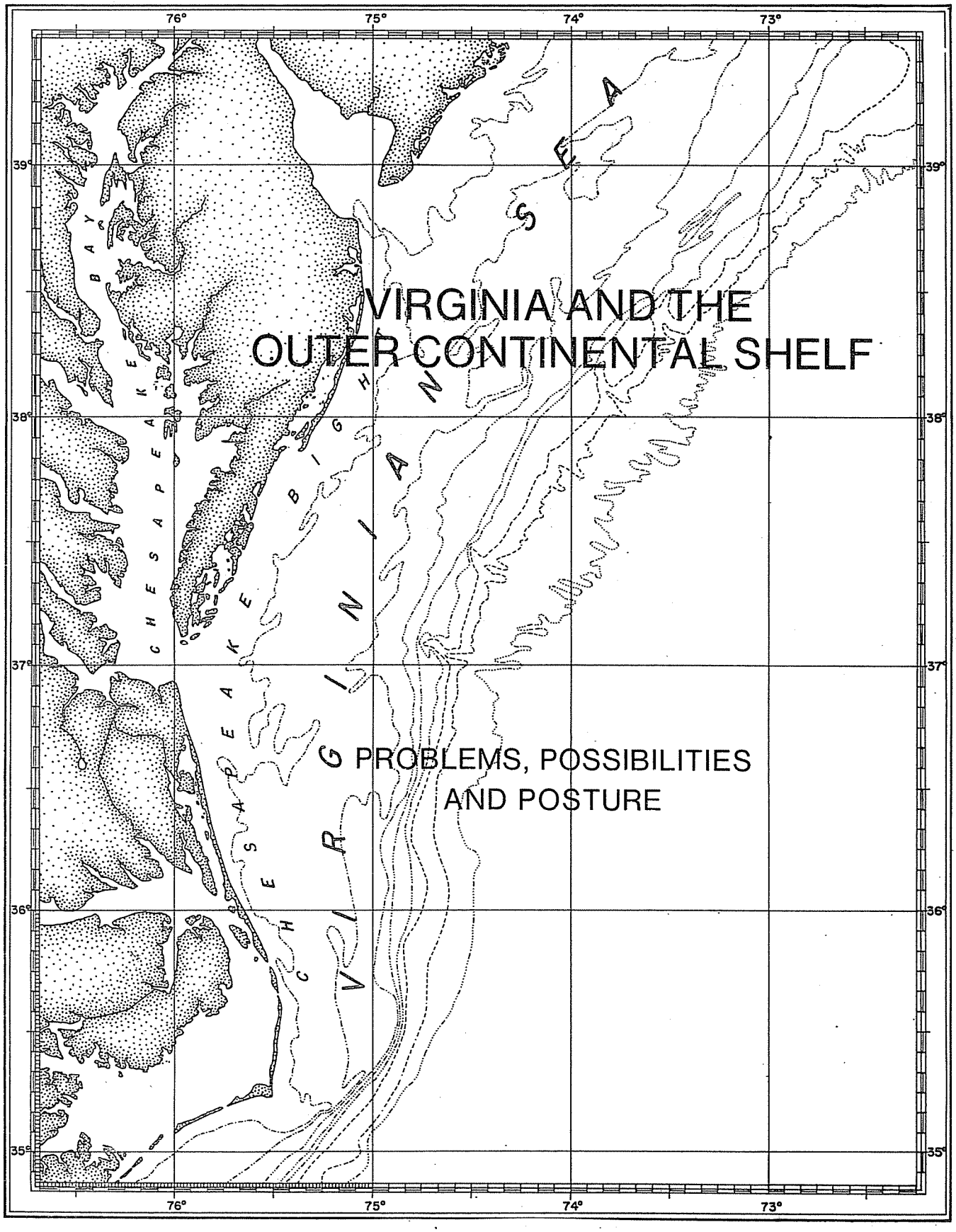
1974

Virginia and the Outer Continental Shelf : problems, possibilities, and posture

The Committee



VIRGINIA AND THE OUTER CONTINENTAL SHELF

PROBLEMS, POSSIBILITIES AND POSTURE

VIRGINIA
AND THE
OUTER CONTINENTAL SHELF:
PROBLEMS, POSSIBILITIES,
AND
POSTURE

A

Report

of the

Outer Continental Shelf Advisory

Committee

(Ad Hoc)

November, 1974

COMMONWEALTH OF VIRGINIA

OFFICE OF THE GOVERNOR

COUNCIL ON THE ENVIRONMENT

GERALD P. McCARTHY
ADMINISTRATOR
P. O. BOX 790
RICHMOND 23206

November 7, 1974

Honorable Earl J. Shiflet
Secretary of Commerce and Resources
Commonwealth of Virginia
910 Capitol Street
Richmond, Virginia 23212

Dear Secretary Shiflet:

I forward herewith the report of the Outer Continental Shelf Advisory Committee prepared in response to your request for a proposed State policy for the Commonwealth related to the development of the Outer Continental Shelf (OCS).

The report states that damage to the offshore environment is not likely to be great, but warns of gaps in our knowledge of the inhabitants and environment of the area, as well as the effects of oil spills upon them. The possibility of a catastrophic spill, with its attendant effects upon wetlands and beaches, must be considered. Permanent structures on the OCS will interfere with navigation, and constrain commercial fishing in the area, although they may act as artificial reefs, enhancing sport fisheries.

The entire OCS area of study, understandably, poses many legal and governmental problems that could not be addressed within the time constraints of this project, especially in view of yet to be determined rights in all the lands and natural resources of the bed of the Atlantic Ocean beyond three geographical miles from the coastline; nevertheless, these problems impinge upon the area of state and local concern. Our control of the OCS lands is not assured. The Committee, therefore, believes that our opportunity to control potential development from the discovery of oil and gas on the OCS of Virginia is dependent, in part, upon the outcome of the Commonwealth's offshore litigation now pending in the United States Supreme Court. Accordingly, alternative recommendations are proposed by the Committee, recommendations that are based upon the degree of Virginia's control of the waters and lands adjacent to the onshore areas.

The report recommends that measures to control development should insure preservation of the traditional lifestyles and values of Virginia's coastal citizenry. In this regard, the Committee believes that the state should develop criteria for the siting of facilities with greater than local impact.

The Committee is cognizant of the complexities of our subject, and offers this report in the hope that its recommendations will catalyze the necessary action to fulfill the expectations initiated by your request. It is the hope of the Committee that this report can be useful to you, the Governor and interested members of the General Assembly in order that the entire spectrum of OCS problems and proposals can be given early consideration.

On behalf of the Committee I thank you for the opportunity to contribute to Virginia's preparation for meeting the challenges posed by the development of the Outer Continental Shelf resources.

Sincerely,

Gerald P. McCarthy

Gerald P. McCarthy
Chairman

GPM:dja
Enclosure

PREFACE

The Outer Continental Shelf Advisory Committee was established by the Secretary of Commerce and Resources, Earl J. Shiflet, in July, 1974. This action was taken based upon the realization that the Atlantic Outer Continental Shelf (OCS) was a likely area for the development of offshore oil and gas resources, and that such development could have profound and far reaching impacts upon the Commonwealth. Such impacts could either be beneficial or detrimental or both, depending greatly upon the preparations made by the Commonwealth beforehand. Accordingly, Secretary Shiflet charged the OCS Advisory Committee to consider all facets of the situation, and to prepare a report recommending a posture for the Commonwealth.

The following report represents a first step in an effort to engender debate and discussion of the issues involved in the question of OCS development. It is the feeling of the committee that, while further discussion is necessary, and encouraged, on some particulars, there is general consensus on the content, conclusions, and recommendations presented herein.

OUTER CONTINENTAL SHELF

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State Air Pollution Control Board

Dr. M. I. Shanholtz
Commissioner
Department of Health

Mr. John Pleasants

Virginia Institute of Marine Science

Project Leader

ACKNOWLEDGEMENTS

This report is the result of the joint efforts of the agencies of the Outer Continental Shelf Advisory Committee. All made valuable contributions. Worthy of special note was the work of the personnel of the agencies designated as "core" agencies in the preparation of this report. These were:

Mr. Julian Alexander
State Water Control Board

Mr. Donald LeVan
Division of Mineral Resources

Mr. Gerald L. Baliles
Office of the Attorney General

Mr. Edward Holm
Division of Industrial Development

Mr. James Douglas
Marine Resources Commission

Mr. B. C. Leynes
Division of State Planning and Community Affairs

Mr. John Pleasants
Virginia Institute of Marine Science
(Lead Agency)

The core agencies furnished the authors for the individual sections, and to these people is due a large share of the credit for this report. They, and the sections they wrote, are as follows:

Dr. Donald Boesch - VIMS
III - Offshore Area

Mr. Thomas Barnard - VIMS
IV - Interface Area

Mr. Daniel Jones - DSPCA
Mr. Keith Buttleman - DSPCA
V - Onshore Area

Mr. Gerald Baliles - Attorney General's Office
Appendix A - U.S. v. Maine, et al

Section I - Executive Summary, and Section II - Background, were written by the project leader, who also served as editor. The remaining section, VI - Recommendations, was a group effort.

In addition to these "core" agency personnel valuable assistance was made by the following individuals:

Mr. Bill Craft
Virginia Port Authority

Mr. O. H. Adams
State Health Department

Mr. James F. McInteer
Commission of Game and Inland
Fisheries

Mr. Henry J. Hughes
State Air Pollution Control
Board

Mr. Carl Schreiber
Commission of Outdoor Recreation

Input from the petroleum industry was provided by Dr. Wilson Laird of the American Petroleum Institute, who not only provided voluminous amounts of literature, but also traveled to Gloucester Point to discuss the situation with members of the core agencies. His assistance is gratefully acknowledged.

Mrs. Virginia Camechis patiently typed and retyped the many drafts and the final copy.

Mr. W. S. G. Britton and the Virginia Department of Highways are responsible for reproduction of the document.

To all these people goes the sincere thanks of the project leader. Lady and gentlemen, it has been my pleasure.

John B. Pleasants
Virginia Institute of
Marine Science
Project Leader

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I

Executive Summary

The possibility exists for the discovery of both oil and gas off the coastline of Virginia. The area of interest is called the Baltimore Canyon Trough, which is near the edge of the continental shelf in our waters. This report attempts to evaluate the impact of such a discovery on Virginia and to make plausible recommendations for action by the Commonwealth to control any resulting development, both offshore and on.

The area of our concern for purposes of this report has been divided into three sections as follows:

Offshore - from the edge of the shelf to the three mile limit of the marginal sea

Interface - from the three mile limit to the upper of the limit of the wetlands, and

Onshore - from the upper limit of the wetlands inland

The quantity of oil and gas on the Outer Continental Shelf (OCS) - or even its existence - is unknown. We have assumed a major find on the assumption that if our posture is adequate for a large find, it will also prove sufficient for anything less. Other necessary assumptions are also made, including:

(1) Development of related industry onshore will

(CEQ) estimates very little probability of oil from a spill in Virginia's OCS area impinging on the coast. The most likely month for such an occurrence is August, and the probability then is five percent. This has been questioned by some scientists.

Further, oil was spilled in great amounts on Virginia's coast during World War II and has had no readily apparent long-term effects.

Also to be considered, however, are the effects of chronic hydrocarbon pollution in minute amounts on the biota of the OCS area. These effects are largely unknown. By-products of drilling may also have localized effects.

The possibility for financial benefits of considerable importance accruing to the state is excellent if oil or gas are found off our coast. Jobs will be created not only in the oil industry itself, but in supporting industries, as well as secondary development such as restaurants, shopping centers, and housing.

Against these benefits must be weighed the possibility of environmental damage, which could affect such established industries as tourism and commercial fishing. Other costs would be incurred in the area of public services.

The major concerns by area are as follows:

Offshore Area

(1) The incorporation of oil in sediments either through the catastrophic or chronic discharge of petroleum to the environment.

(4) The requirements for increased public services.

In order to control the situation, recommendations are made as follows:

Overall Recommendations

(1) Insure compatibility between any OCS actions and the currently evolving Coastal Zone Management Plan.

(2) Oppose any drilling on OCS lands until an effective oil spill cleanup association similar to those in other areas has been formed.

(3) Support research designed to fill the gaps in our knowledge of the marine environment and the effects of hydrocarbons on the biota, particularly in the offshore area.

(4) Formalize and continue the present OCS Advisory Committee (ad hoc).

Recommendations for the Offshore Area

If Virginia is awarded control:

(1) Establish leasing, production, and inspection regulations similar to those of the Federal government.

(2) Assign responsibility for all OCS lands to a state agency. The Virginia Marine Resource Commission, if greatly expanded and properly equipped and funded, might be a logical choice. Alternatively, a new agency could be created.

II

Background

Scope of the Study

This report concerns itself with the impacts upon Virginia and Virginians of the possible exploration for, and exploitation of petroleum resources on the Outer Continental Shelf (OCS) lying to the east of our state. It further recommends courses of action to control the development of these resources as well as that of the possible supporting industries which may be based in our state.

In order to address these problems, this report will discuss our current coastal environment, the effects of drilling, the laying of pipelines, and air and water pollution that could be caused by industrial and secondary development on shore. The possible effects of catastrophic and chronic oil spills will also be considered.

The social effects will be addressed. As an example, should a predominantly rural area become the setting for a refinery or a large logistical support operation, the social implications--the changing lifestyles, patterns of employment, the arrival of large numbers of outsiders--might create problems with which the local area is ill equipped to cope.

Legal problems will be discussed. These include consideration of the outcome of the court case (U.S. v. Maine, et al) to which Virginia is party, as well as the

to the necessity of making certain assumptions. Since the entire report is based on these assumptions, it seems logical to state them here.

For the purpose of this report, it is assumed that:

(1) The area of the petroleum discovery considered will be somewhere off the coast of the middle Atlantic States, most importantly between latitudes 36 32'N and 38 05'N, and will be on the continental shelf or slope.

(2) The volume of production will be in the high range of possibility, on the order of .75 million barrels per day by the year 1985, and 1.5 million barrels per day by 2000. Gas discoveries will produce on the order of .9 billion cubic feet per day by 1985, and 3.6 billion cubic feet per day by 2000.(1)

(3) Development or related industry will take place on the Eastern Shore, in the Hampton Roads area, and possibly to some degree in the York River entrance area. The year 1985 is the target year for which impacts are assessed.

(4) If the State should be granted title to 100 miles of the OCS, leasing for exploratory drilling would likely begin sometime in late 1976 or early 1977. If the federal government is assigned control, leasing might begin

fact was brought sharply home to us during the winter of 1973-74, when the Arab Oil Embargo lowered speed limits, thermostats, rate of production and morale.

The end of the embargo, however, did not mean the end of the supply problem. The petroleum was there, all right, but the price had quadrupled. Even without price increases, economists had predicted problems with our balance of payments vis-a-vis the Arab world due to our soaring demand for oil. With the increases, these problems become even more acute.

All predictions indicate that continued petroleum imports will be required, whether or not the OCS resources are developed, at least until 2000. This will be despite any savings that may result from even very stringent conservation measures. Our best approach to closing the gap between supply and demand therefore consists of reducing dependence upon imports to the maximum extent practicable by increasing domestic production to complement present or potential sources of energy such as coal, shale oil, geothermal, and nuclear fission. Nuclear fusion, which promises clean, nearly inexhaustible energy, may be the long term solution.

In our current situation, however, the environmental trade-off appears to be:

(1) Increase imports of foreign crude oil. This implies either a much greater number

the acreage of the continental shelf available for leasing to ten million acres in 1975. At the time of the Presidential energy message (23 January 1974) in which the tripling of the original OCS leasing was directed, a commitment was made to conduct an environmental study by the federal Council on Environmental Quality (CEQ) prior to any leasing. This study has been completed, and forms a very valuable source book for this report.(1)

It is important to understand at this point that there is nothing new or untried about offshore drilling. In 1972, some 12% of our domestic petroleum production and 13% of our natural gas production was from offshore wells, and many foreign countries as well depend upon American developed equipment and expertise in the exploitation of the petroleum resources of their continental shelves.(1) According to Mr. Charles D. Mathews, President of the National Ocean Industries Association, over 17,000 wells have been drilled at sea. Of these, only four have had spills in excess of 5,000 barrels. He feels, to be fair, this very small percentage should be considered when one contemplates the possibility of an oil spill affecting the coast. As an example, the CEQ study gives as the greatest possibility of oil from the southern end of the Baltimore Canyon Trough reaching shore as five percent in the month of August.(1) If we follow Mr. Mathews' argument, this five percent should be multiplied by the chance of the spill oc-

greatest depth and consequently here the area of the thickest sediments is found. According to Dr. Wilson Laird of the American Petroleum Institute, this is the area of predominate interest.(5) The trough continues down into our waters and though the sediments are not as thick here, considerable interest remains.

As previously stated, there has been to date no reported exploratory drilling on the Atlantic OCS of the United States. However, off the coast of Canada, in similar sedimentary deposits on the Nova Scotia Shelf, 89 exploratory wells have been drilled. These indicate the presence of hydrocarbons, particularly natural gas and natural gas liquids. At the time of the preparation of the CEQ report, four wells had indicated commercial quantities.(1)

The prospective resources of the Atlantic OCS must be viewed against the national supply of, and demand for petroleum. During 1973 the situation was as follows:

Pipelines have much to recommend them from an environmental standpoint once they are in place. Their record as regards spillage is generally excellent as compared to tankers. Burial of pipelines which are laid in less than two hundred feet of water is now required by the regulations of the U.S. Geological Survey. Of course, the area affected by dredging for pipelines is miniscule when compared to the total area of the shelf. On shore, it is most common to lay pipelines in wetlands in dredged canals. This can obviously cause serious local environmental damage by disrupting drainage patterns and burying the biota as well as physically removing it. Turbidity, variations in salinity and changes in current flows can also result.

A further possibility to be considered is that of temporarily storing petroleum at sea in the area where it is produced. This may be done in elevated, floating, or bottom standing depots. The first is quite limited in size. The floating storage barges currently in use may hold as much as one million barrels, and be secured to a single point mooring system (SPM), which also serves as a loading/unloading facility.(1)

The bottom standing systems may be completely submerged, as in the Persian Gulf, or a surface-piercing type similar to Ekofisk in the North Sea, which also has a capacity of one million barrels. Both of the above systems employ single point mooring for loading and discharging their contents.

As a final thought, the problem of transportation of

The biota is varied, and many sport and commercial species are represented, including the American lobster in the rocky cover of the slope. The shelf itself produces surf clams, several species of flounder, sea bass, scup, hake, and other commercial species. The superjacent waters produce tuna, dolphin, bluefish and mackerel, as well as menhaden. Much of the area is used as a spawning grounds for several marine species, with a great fan shaped deep current acting as a transport system to carry the larval forms into the Chesapeake Bay. Although exact parameters for this inward flowing current are not known, the overall concept must be kept clearly in mind, since the implications for the eventual transport of deep offshore pollutants into the bay are clear.

Additionally there are many varied species of plankton, seasonally dense, which are the base of the food web, and great numbers of benthic organisms which, while not commercially exploitable, are of vital importance in the overall scheme.

The oceanic coast of Virginia is divided into two parts by the entrance to Chesapeake Bay. The northern part is characterized by a chain of barrier islands protecting extensive salt marshes from the Atlantic Ocean, with associated lagoons and winding creeks. Since there is relatively little fresh water inflow to the system, the salinities are usually fairly high, ranging upwards from about 18 parts per thousand to normal sea salinity of 35 parts per thousand. The area is in a nearly natural state, and most of the barrier islands are in the hands of the federal government, The Nature Conservancy or the state.

and wetlands upon which the productivity of the bay depends to a great degree. This is particularly true of the western shore.

There are many commercial species dependent upon the bay and its wetlands at some point in their life cycle. Rockfish, shad, herring, croaker, spot, flounder, bluefish, menhaden, blue crabs, oysters, clams, scallops--the list is very extensive. All are important to Virginia's economy, and all could be affected by the chronic or catastrophic release of hydrocarbons.

The oyster industry, one of the most valuable of Virginia's commercial fisheries, is particularly vulnerable to any disruptions in the James River, since the seedbeds there produce the majority of the seed oysters upon which the industry depends.

The land environment in the area of our concern is also of importance, since it is here that development to support the exploitation of OCS resources will occur.

The Eastern Shore is a peninsula flanked on the west by Chesapeake Bay, and on the east by the Atlantic. It is flat, with a maximum elevation in the area of 20 feet. The sea side is bounded by a chain of sandy barrier islands, largely unspoiled, to which the only access is by boat. Behind these islands are extensive areas of shallows and salt marsh, drained and divided by nearly numberless winding creeks and channels.

The bay side of the shore has long beaches and low

current capacity of 50,000 barrels per day.

Legal Aspects

In 1969, the state of Maine assigned certain exploratory rights to a private corporation beyond the three mile limit. A suit was thereupon brought against the state by the United States, to which the twelve other Atlantic Coastal States became party, to determine rights on the Continental Shelf beyond the three mile territorial limit. Virginia, represented by the Attorney General's Office, has taken a leading role in these proceedings. The matter is still in dispute; the Special Master appointed by the Supreme Court of the United States has recently filed a report recommending that the position of the federal government be sustained. The Court has called for briefs from the states and from the federal government, all of which are to be filed before December 31, 1974. The case is expected to be argued in January or February, 1975, with a decision to be announced by June. For a full explanation of the legal issues involved, see Appendix A.

As a secondary consideration, a series of international conferences on the Law of the Sea are currently underway, the first (at Caracas, Venezuela) having recently been completed. While there were no concrete results, one of the items under consideration involved the possible establishment of an internationally recognized limit of twelve miles for territorial waters. It is felt that this will again be put forward (probably as some part of a package proposal) when the Law of the Sea Conference reconvenes

considerations at this junction preclude an analysis of related legal problems involved with OCS development until the matter of United States v. Maine et al., is resolved.

Meteorological Conditions

An obviously important aspect of the environmental safety of OCS development is the meteorological conditions in the area of our consideration. It should be stated here that we believe the CEQ Study is misleading in regard to our area since it apparently considers meteorological conditions on the Middle Atlantic OCS to be more severe than those in the North Sea.(1) While it may be true that our offshore area is subject to hurricanes, whereas the North Sea is not, the weather conditions in general, particularly in the winter months, are believed more severe there. Only two spills from offshore structures of over one thousand barrels have been ascribed to hurricanes.(1)

Bad weather has a greater controlling effect on poloratory drilling than any other phase of the petroleum recovery operation, since mobile rigs are involved. Of course, the threat of extreme weather would cause the temporary abandonment of any sort of OCS operation.

Prevailing winds in the Virginian Sea are generally from the northwest during the fall and winter, and from the southwest in spring and summer. Wind speeds during summer average six to eight knots and during winter eight to ten knots. In summer, winds blow onshore in the daytime, and offshore at night.(2)

and are not noticeable in the open sea due to their low amplitude there. They become very high in shallow water, however, and can cause considerable damage onshore. There is no record of tsunamis in the Virginian Sea, and they are not expected to affect OCS operations there.(2)

Clearly, it is important that any plans for construction and operation of OCS facilities include provision for these and other environmental factors which would effect safety and security of the facilities themselves, the personnel on them and the environments and resources within their range of influence.

Introduction to the Report

The foregoing has been a general discussion of the area that would be involved in the development of Virginia's Outer Continental Shelf, and some of the prospects and problems that must be considered by those who hope to approach the very real issues in a logical fashion. The three succeeding sections will discuss in detail the geographic divisions--Offshore, Interface, and Onshore--that have been previously laid out. The last section in the report will make recommendations for action to control the situation in order to assure that Virginians, their property, and their environment are protected, and that resources are reasonably managed.

III

Offshore Area

A thorough consideration of the environmental effects of development of OCS oil and gas resources should take into account the existing environmental conditions of the offshore area, the activities which may potentially impact this environment, and the susceptibility and response of the environment to these activities. Assessments of the effects of OCS development on the offshore areas must necessarily be imprecise and vague because of both the lack of detailed knowledge of the continental shelf environment and the inadequacy of knowledge of the effects of the contemplated developmental activities on this environment.

The Continental Shelf Environment off Virginia

The continental shelf environment off Virginia is distinctly different from the coastal environments of the Chesapeake Bay and Eastern Shore, in terms of physical, chemical, geological and biological processes, yet the environments interact intimately--one affecting the other.

The offshore water masses in the Virginian Sea affect the movement and characteristics of shelf waters. The Gulf Stream, flowing well off our coast, affects the direction and velocity of shelf currents, causing predominantly southerly flows. Yet the tidal flux of water through the Virginia Capes and into the Chesapeake Bay also affects the flow of water--particularly bottom cur-

tolerate the summer temperatures of the Bay. There are also specialized forms adapted to live in the dynamic sediments of the shelf such as the commercially fished surf clams.

Activities in OCS Development Having Potential Environmental Impact

This portion contains a discussion of activities in the exploitation of offshore oil field which may impact the environment adversely. The effects of some of these activities are likely to be insignificant. On the other hand, the effects of seemingly innocuous practices may be insidious, with currently unknown but far-reaching consequences. Thus, for completeness, all of those activities potentially affecting the environment will be discussed without presumption of the relative seriousness of their impact.

Not only must the effects of producing oil and gas on the OCS of Virginia be considered, but also the more imminent effects of exploration, exploratory drilling, and developmental drilling should be evaluated.

Exploration

Early in the exploratory phase of oil field development, extensive seismic surveys must be conducted to investigate the subsurface geological structure of the area. From these surveys petroleum geologists determine if the sedimentary environments represented in subsurface deposits are conducive to the formation of petroleum and if faults, domes and other features which trap and concentrate oil and gas are present. In the past, seismic surveys involved detonating explosive charges in the water resulting in

in permanent obstructions, the operations themselves may impair other uses of the OCS, such as commercial trawling and transportation during the period of active exploration.

Development and Production

Once significant discoveries are made by exploratory drilling, development and production activities may proceed in the oil or gas field. Again, drill cuttings and drilling mud disposal may have local environmental impacts.

Once the oil well is in production, "bleedwater" brought up with and separated from the oil by "oil-water separators" is usually disposed of overboard. Bleedwater is usually of very high salinity and contains substantial amounts of oil--on the order of 50 ppm (parts per million). Sand is also often brought up with the petroleum and it must be separated and discharged overboard where it may impact benthic communities. As previously stated, the risk of blowouts is substantially less during production than in the exploratory drilling and development stages. Nonetheless, production blowouts can occur if pressure in the well suddenly increases. Production and development rigs are usually built resting on the bottom, or sub-sea well heads are employed. Too often the incentives to remove unused or obsolete platforms and sea bed structures do not out weigh the costs of removal, resulting in semi-permanent obstructions to other uses of the OCS. Again, the accidental or careless loss of debris and refuse from production rigs may impact the environment.

They would also be an obstruction to other uses of the continental shelf.

Environmental Effects of OCS Development

Solid Wastes

Overboard discharge of drill cuttings, drilling mud and sand from wells may cause smothering of the benthic organisms or benthic habitat alterations localized in scope. This is not a necessary practice and can be controlled by regulation.

Potentially more serious is the introduction of compounds which may be harmful in trace amounts. Drilling muds can contain substantial quantities of refined oil--similar to number 2 fuel oil--which is used to achieve proper viscosity and lubrication. Because this oil is thoroughly mixed with the mud itself, much of it will be deposited on the bottom. It is well known that petroleum hydrocarbons can persist for long periods of time in bottom sediments where they may affect benthic organisms, leach into bottom waters, or be resuspended by currents. Chemical additives in drilling muds include barium compounds which are toxic to marine organisms. Widespread deposition of trace amounts of these and other toxic compounds may result from drilling activities.

Chronically Discharged Effluents

Discharges of bleedwater and other liquid wastes from offshore production platforms would probably be diluted so rapidly that any toxic effects on marine life would be

skepticism has been voiced by the National Academy of Sciences regarding the validity of the mathematical models which allowed CEQ to predict that the chance of floating oil reaching the shore of Virginia from OCS drilling sites is virtually nil. The oceanographic and meterological data base on which these predictions are based is inadequate, and the model itself is at variance with some of these data.

Those offshore organisms potentially most susceptible to the effects of spilled oil are seabirds, which may be coated with floating oil, organisms which live at the air-sea interface (the neuston), and benthic organisms, because sedimental oil may concentrate and persist in the bottom. Reliable predictions of effects, except perhaps on birds, are not possible because of inadequate knowledge of the offshore effects of previous oil spills.

Dredging

Dredging activities attendant to navigational channels and pipeline placement may impact offshore organisms primarily through the removal of benthic habitats and the suspension of sediment and associated compounds. Generally speaking these effects are not considered as serious as they may be in inshore waters because bottom sediments over much of the shelf are naturally dynamic and thus the ability of most of the biota to recover from damage is good. Further, shelf sediments are mostly sands, whereas it is typically the finer particles which have adverse effects if resuspended.

Extension of navigation channels onto the shelf

petroleum.

(3) The effects of oil spills on sea birds.

Conclusions

The threats posed by OCS development to the environment and organisms of the offshore area of the Virginian Sea are unknown. Assessments of impact such as that by the Council on Environmental Quality have, in general, not given proper consideration to effects on offshore environments. This has probably been due to pressures to develop predictive models and make definitive statements about impacts on little known environments. It is not sufficient to base impact assessments largely on the basis of the probability of spilled oil reaching shore.

If exploitation is to proceed, strict regulation to ensure environmental protection should be developed and enforced. Specifically, spill prevention devices and regulations need to be adequately policed, since some blowouts in offshore oilfields elsewhere have followed inadequate enforcement of the regulations by federal and industrial authorities. Standards must be set to regulate chronic discharges from production platforms. To this end, effluent limitations are currently being developed by the Environmental Protection Agency. However, these effluent limitations are based exclusively on technological considerations. Research is needed on the effects of these discharges so that environmentally relevant discharge standards may be implemented.

IV

Interface Area

General Description

Although the Interface Area includes the subaqueous lands out to the three mile limit, the impacts of offshore oil activities will be felt primarily in the relatively shallow inshore areas and in the intertidal and wetlands habitats. Major discussion in this section will therefore center on the three above-mentioned subareas within the larger Interface Area.

Virginia's shoreline, of which there is almost 5,000 miles, is best characterized by its variety. This variety extends from the serene fragility of the barrier islands of the Eastern Shore to the glittering strip of Virginia Beach, and from the industrial activities of Hampton Roads to the quiet productivity of Chesapeake Bay marshes. In its shoreline, Virginia has a natural resource of inestimable value.

The Eastern Shore of Virginia is a low-lying peninsula bounded on the east by a barrier island - marsh-bay complex and on the west by a marsh-tidal creek complex. Extensive and highly productive shallows occur on both coasts and in the tributaries. The Eastern Shore contains about 70% of Virginia's ocean front shoreline, and from Wallops Island south it is the only portion of the eastern barrier island chain (from Cape Cod to Cape Hatteras) which remains in its natural state. The Eastern Shore also con-

the shoreline of the Elizabeth River is unaltered and the sediments in the river are highly contaminated from one source or another. The northern side of the James River is also highly developed in the Hampton Roads area but the river itself is still important as a seed oyster and clam producing area. Except for the Nansemond River, which also appears to be headed towards heavy industrial development, a few small tidal creeks, and the Ragged Island Marsh, most of the natural shoreline of the lower river has been developed. Because of the rapid population growth of the Hampton Roads area, the rivers are highly stressed by sewage and other effluents. It is also important to note that the channels of both Hampton Roads and the Elizabeth River are scheduled for expansion or deepening, or both, in the near future.

Except for its lower southern bank, which has several industries and military establishments, the York River retains its natural character with residential areas spotted between large marsh areas and small tidal creeks. Water quality is relatively good and the river supports a considerable commercial seafood industry.

North of the York River the shoreline is characterized by small fringing marshes and tidal creeks. The natural character of the shoreline remains since coastal development has taken the form of residential housing small commercial seafood operations, and small marinas.

In summary, the oil industry will have to compete

would be required, and because the preferred method of transporting crude oil from offshore fields is by pipeline. As previously stated, vessel transport will be employed only if the fields are small. Port development will be needed, however, for the staging of materials and men during exploration and construction periods and this is most likely to occur on the Eastern Shore or the Hampton Roads area.

Most of the existing channels in the Hampton Roads are adequate to handle the vessels necessary, but if the Eastern Shore or undeveloped portions of Hampton Roads are utilized, new channels will have to be dredged. In this case, dredging and disposal of the dredged soil will have a major impact.

Depending on the amount of dredging necessary, impacts may be in the form of destruction of benthos (bottom) communities and fish feeding and spawning grounds, altered salinity regimes and current patterns, destruction of marshes, and interference with water column productivity and fish migration routes through increases in turbidity. Large amounts of spoil from such dredging will have to be disposed of, and this may well place more stress on wetlands and benthic habitats, since these are the most economical disposal areas in the short term.

Most of the impacts described above may be avoided if the state takes strong measures to insure that the oil industry utilizes the existing port facilities and channels of Hampton Roads and the Eastern Shore. With the planned

organisms in Los Angeles Harbor have been reduced to one tolerant species of oil industry wastes.(5) In more open areas where there is greater dispersion of the effluent, the biological effects,where known, do not appear to be as serious. Where chronic effects have appeared, such as in Los Angeles Harbor and the Houston Ship Channel, not only direct toxicity is involved but also depleted oxygen levels due to high oxygen demand by contaminated sediments and other oxygen consumers.

On the Eastern Shore, receiving waters are naturally somewhat organically loaded and the interactions of other variables such as stream morphology, freshwater inflows, tidal forces and salinity make these streams less than satisfactory as receiving waters.(6) Numerous shellfish beds are found in waters surrounding the Eastern Shore and stringent water quality standards and criteria have been set to protect both general water quality and the quality of water required to support shellfish and finfish. Any development by the oil processing industry on the Eastern Shore, unless closely controlled, could adversely affect the survival and quality of fish and shellfish there because of the poor suitability of the surface waters to receive effluents. This would have substantial impact upon the seafood and recreational fisheries of the area.

The fact remains, however, that the proximity of the Eastern Shore to the continental shelf and the undeveloped and therefore relatively inexpensive land available make

ment areas for housing or industry. Hopefully, the Wetlands Act will control such development so that essential natural habitat will be preserved.

The lower York River has experienced some water quality problems associated with domestic and industrial waste discharges. A new sewage treatment plant is planned in the area, but water quality at this time is generally good. This area does contain large wetlands, which may be threatened by development because of a lack of suitable upland industrial sites.

In addition to increasing pressures on the environment in the form of wetlands destruction and effluent releases, development of petroleum related industry will increase the chances for spills of refined products. The effects of such spills are discussed more fully below.

Tanker Traffic

It is difficult to project the effects of an offshore oil discovery on the number of tankers utilizing Virginia waters. As previously stated, however, it appears that if a pipeline is used to transport the oil, the number of tankers entering Hampton Roads might be smaller than if no oil were discovered at all. Further, the transport of refined products from refineries must be considered.

According to Porricelli(9), tanker and barge transport of oil and oil products amounts for 30% of the oil released into the marine environment. The same study estimates that 75% of the spills from tankers are caused by human error and 25% by mechanical failure. This record points to the need for improved design of handling systems to prevent such

The West Falmouth spill was relatively small by volume. Between 171,000 and 184,000 gallons of #2 fuel oil were released into Buzzards Bay when an oil barge grounded. The immediate effect was a massive kill of marine life including fish, shellfish, crustaceans, and worms and other invertebrates. Sampling showed a 95% mortality of organisms in the spill area. It is important to note that although all visual effects of this refined product were gone within a few days, scientific sampling techniques demonstrated that after eight months the oil was still spreading along the bottom and killing the organisms there. Bottom sediment was contaminated in 42 feet of water at the deepest point in that part of Buzzards Bay. Very little bacterial breakdown of the oil had occurred eight months after the spill. Commercial shellfishing was prohibited for two years in the area, and it appears that shellfish productivity will be affected for a much longer period. Destruction of the Buzzards Bay biota reduced the stability of sediments and this has resulted in increased erosion. Damage to shellfish for the first year alone has been estimated at $118,000 by the town of Falmouth. Another $200,000 was paid to the Commonwealth of Massachusetts for resource losses. The actual ecological damage is estimated to be much greater.(10,11)

As for crude oil, one of the primary impacts of a spill in the Interface Area would be its effects on the coastal birds. The Torrey Canyon, Santa Barbara and San Francisco Bay spills have all demonstrated that oil releases

to the effects of oil, but little research has been conducted in this area.

Forecasting the economic impact of a catastrophic oil spill on the Tidewater area is difficult, but it can be said that the impact may be considerable under the proper circumstances. Direct effects of the Santa Barbara spill on commercial fish species have not been demonstrated, but the presence of the oil prevented fishermen from trawling, and thus affected their incomes. Other studies such as that of the West Falmouth spill have shown tainting of shellfish to be a problem which can last for years, with the exact duration still unknown. Many oil pollution scientists are also concerned about the possible retention of carcinogenic hydrocarbons by shellfish and other species well after any noticeable taint has disappeared.

A large oil spill in the vicinity of or reaching the Virginia Beach resort area would have a significant impact on tourism in the area. Even if the spill did not occur during the summer season, the adverse publicity would have some impact on tourism even though the beach might well be cleaned beforehand. In addition to aesthetic considerations, the present erosion problem at Virginia Beach could be exacerbated by the removal of beach sand during cleanup operations as well as by changes in the normal beach processes brought about by the mixing of oil and sand and the destruction of normal biota.

pollution. Although no quantitative data exists on the use of biodegradation, indications are that there is a potential for enhancing the natural activity of oil-degrading bacteria and yeasts.(2)

Since environmental awareness in the oil industry is relatively new, there is a great deal of research needed to improve all of the above cleanup and containment techniques. New methods and materials will be forthcoming in the near future since considerable research is already underway. For the present, however, natural processes will generally have to be counted on to do much of the cleaning up after a spill.

Pipeline Effects

Both from an industrial and environmental viewpoint, the transport of crude oil from offshore fields by pipeline is preferred to transport by tanker and barge. This is not to say, however, that there are no problems associated with pipeline use. Pipelines generally have a better record as regards spills than tankers simply because there are fewer opportunities for a spill to occur. The major impact of a pipeline on the environment occurs during installation.

All pipelines placed in less than 200 feet of water must be buried according to federal regulations. This involves large amounts of dredge spoil and temporary disruption of the benthic area. Wetlands in Louisiana have experienced significant temporary and permanent damage since the two methods developed there for laying pipelines in

If the pipeline crossing the shoreface is buried there is less environmental risk involved and the excavation impact may be temporary in nature, provided that trenches are backfilled and marsh species replanted. It is very important, however, that the location of the crossing point be given careful consideration. For example, the location chosen should not be one which has had a history of temporary inlet formation since the pipeline could be scoured out by a reoccurrence(14)

A pipeline through the Chesapeake Bay entrance would have a temporary impact due to dredging. There would be, however, the advantage of less wetlands destruction as well as that of ultimately coming ashore on a lower energy coast than than found on the ocean front.

Major Concerns

The following are the major concerns in the Interface Area which are occasioned by OCS development:

(1) If new port facilities are developed major impacts will be caused by the dredging of channels. Care must be taken that spoil from such dredging is disposed of in accordance with accepted standards.

(2) Satellite industries may be expected to locate on the Virginia coast and these may cause impacts in the form of effluents, wetlands destruction, water usage, and increased chance of spills of refined products. The

not allow satisfactory recovery of spilled oil, especially in rough seas. It appears that more adequate techniques will be forthcoming in the near future.

Conclusions

Virginia's shoreline, measuring some 5,000 miles, is a natural resource of an estimable value to its citizens and the hundreds of thousands of tourists which visit the area annually. Already stressed by population pressures, this coastline would undoubtedly face further stress from OCS oil and gas development. The commonwealth must take the necessary steps to learn the impacts associated with all ramifications of OCS development. Little is known of the sublethal effects of hydrocarbon compounds on estuarine organisms. A much greater knowledge of such characteristics as carcinogenicity, persistence and toxicity must be acquired to properly assess the impacts of development of a petroleum industry in Virginia. Spill prevention and cleanup methods are as yet inadequate and must be refined.

The unknown adverse factors mentioned above as well as the known adverse factors such as wetlands destruction, benthic community disruption and the effects of effluents could all have an undesirable impact on the state and its citizenry. Firm control backed by adequate knowledge of all impacts associated with OCS development is necessary if the seafood and tourist industries as well as the present quality of life in Virginia is to be maintained.

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V

Onshore Area

The area that must support any development of the OCS off our shores is the land itself. Here could be located not only the refineries, the tank farms, and the petrochemical complexes, but also the housing, schools, restaurants and shopping centers required to support the workers. The land and its people would reap the benefits of such development, but would also be required to bear the burden of costs for the added public services required, including police protection, firemen, local administration and hospitals. There are the further considerations of increased water requirements (both domestic and industrial), solid waste, and sewage, plus the attendant potentials for air and water pollution. All are discussed below.

General Approach

The impacts of high level OCS oil and gas development upon the onshore portion of the Commonwealth have been projected for 1985 by means of a three step process. First, an industrial development scenario was drawn based on the production level assumptions of Section II and a number of known or reasonably projected product demand and plant location constraints. This scenario resulted in a description of statewide impacts which can be applied to either of two primary impact areas (Eastern Shore or Hampton Roads/York River entrance) or to the remainder of the state. The

Finally, mention must be made of the impact of new air pollution control regulations and federal court rulings upon both industrial and secondary developments. Indirect sources, for instance, such as facilities which attract more than a certain number of vehicles, will be controlled by permit after 1 January 1975. New industrial sources must also be permitted. Further, new industrial sources to be located within a standard metropolitan statistical area (SMSA) must not prevent maintenance in that area of National Ambient Air Quality Standards. Outside the SMSA's, EPA non-degradation requirements may pose problems.

Assumptions

Major assumptions of the onshore section of this report, which are in addition to the overall assumptions of Section II, are discussed below. Many of these assumptions are based on the findings of an earlier report entitled "Off-Shore Port Facilities" which was completed in February of this year by the Virginia Off-Shore Port Facilities Task Force. The assumptions are as follows:

(1) Base case I assumes that capacity of the Yorktown refinery will increase by 60 percent to 80,000 barrels per day and that the Suffolk refinery will be built with production of 184,000 barrels per day. Under the base case I assumption, Virginia would have total refinery capacity of 264,000 barrels per day by 1985.

additional construction worker, one additional utility worker, and two additional manufacturing workers. Also, each additional "basic industry" type worker is expected to create an additional service or "supporting" type worker.

(6) All of Virginia's present and future (through 1985) refinery capacity growth will be in the Hampton Roads/York River area.

(7) Two gas processing facilities will be built on Virginia's Eastern Shore by 1985, employing a total of approximately 100 persons.

(8) Two petrochemical facilities will be built in the Hampton Roads/York River area by 1985, employing a total of 2,275 persons.

(9) Brown and Root, a major metal fabricator, is assumed to employ about 1,700 persons on the Eastern Shore by 1985 with OCS production.

(10) Of the 7,520 persons estimated by Resource Planning Associates to be employed in east coast oil and gas recovery by 1985, one half is assumed to be employed in Virginia. Of the Virginia total (3,760), one half or 1,880 would be employed on the Eastern Shore and one half in the Hampton Roads/York River area.

(11) Ratios used to generate figures for the ten social and physical system indicators from

Sewage - domestic	100 gallons per person per day
Solid waste	3 tons per thousand population per day (VA.)
Residential structures	3.0 persons per household (VA.)
Commercial structures	24.5 sq. ft. per person (RPA)

Finally, it is well to reiterate here that this section of the report is based on a major discovery of gas and oil on the Virginia OCS. This assumption is made so that the greatest conceivable impact will be considered on the theory that if Virginia's posture is adequate to handle such impact, it will also prove sufficient for anything less.

Potential Impact Areas

Possible economic impacts of the assumed high OCS development are indicated in Tables 1 through 3. The major factors analyzed include population, employment, and the labor force participation rate. Within total employment, specific areas of analysis include construction, mining, agriculture, manufacturing, utilities, and services.

For historical reference 1972 population and employment figures were used. Projections were then made to 1985 using three different sets of assumptions in reference to refinery capacity in Virginia and OCS development. The absolute change in population and employment resulting from each of the three 1985 development levels is also shown.

The impacts of a high level of OCS oil and gas

are shown as changes in water demand (domestic and industrial), domestic sewage discharge, solid waste generation, numbers of residential structures, and required square footage of commercial facilities. The division between social and physical systems used here is admittedly tenuous. Several indicators have aspects which could fall into either category. Solid waste, for example, impacts upon the physical system by being a physical commodity which requires land for disposal or for an incineration system. At the same time, however, it impacts upon the social system by requiring an effort by local government for its collection and disposal. In general, the physical systems components involve the use or commitment of physical resources such as water and land, while the social indicators involve services.

Eastern Shore[1]

As of July, 1972, the Eastern Shore of Virginia had an estimated population of 43,500. Total employment for the same year was approximately 16,600 persons with the single most important employment sector being agriculture. However, agriculture, traditionally the most important employer in the area, is yielding its dominance to manufacturing activity. Other traditionally large "basic" activities in the area include fishing and the tourist industries. The labor force participation rate as a percent of population on the Eastern Shore currently stands at 43.2 percent.

[1] Consists of Accomack and Northampton Counties.

Eastern Shore mining employment total for 1985 is projected to be 1,880 with 390 persons in exploration, 930 in platform development, and 560 in oil and gas production. It is assumed that one quarter of total east coast oil and gas recovery employment for 1985 will impact on Virginia's Eastern Shore.

An employment gain of 1,500 is anticipated in "other" manufacturing, specifically fabricated metal products with expansion of Brown and Root. Approximately 100 persons would be employed in the two gas processing plants assumed to be located on the Eastern Shore by 1985. Secondary employment gains totaling approximately 3,900 persons would occur in the construction, utilities, and service categories.

Thus, with OCS development the Eastern Shore will have a 1985 population total of 52,900 and total employment of 25,260. The area's labor force participation rate is projected to increase to 50 percent.

Social system impacts on the Eastern Shore associated with the projected population increase of 5,700 include almost 1,500 new school children, 21 new hospital beds, a manpower increase in the local police of nine men, and a rise in state and local government employment of 171. In addition, local government overhead costs would rise by nearly $43,000.

The physical system would see a rise of 0.6 million gallons per day (mgd) in total water demand and 0.57 mgd of domestic sewage for the 1,900 new households gene-

to 264,000 barrels per day. By 1985, the Yorktown refinery in base case I will have a capacity of 80,000 barrels per day and a newly-built Suffolk refinery will have daily production of 184,000 barrels. The population of the Hampton Roads area is expected to reach 1,244,600 by 1985 without off-shore port and OCS development. Total employment is expected to increase to approximately 600,800 persons with the largest gains coming in manufacturing employment. Within the manufacturing sector, more than 700 persons are projected to be employed in petroleum refining. The area's labor force participation rate is expected to increase slightly to 49.6 percent.

As indicated in the assumptions for this section, in base case II an off-shore port facility is built, and refinery capacity increases to 484,000 barrels per day. It is further assumed that all refinery capacity gains would occur in the Hampton Roads/York River area. In base case II the area's population would increase by 4,000 persons over the base case I population for 1985. Total employment would increase by approximately 6,400 persons with a gain of nearly 1,800 in manufacturing. Refinery employment would be up by nearly 600 to 1,300 persons. In base case II the area's labor force participation rate is projected to reach 50.0 percent.

The population of the Hampton Roads area with OCS development is projected to increase by nearly 67,000, reaching a 1985 population total of 1,315,500. Total employment

Large increases would be felt in water demand with 78 mgd required for new industry and 6.7 mgd for domestic supply. Domestic sewage discharge would rise by 6.7 mgd as well. An increase of two hundred one tons per day of solid waste would accompany the 22,000 new households and 1.6 million square feet of new commercial space.

Commonwealth of Virginia

Virginia's 1972 population was estimated to be 4,764,000. Total employment was estimated at 1,860,000. Only ten persons were employed in oil and gas extraction--primarily in southwest Virginia. As previously mentioned, only 225 persons were employed statewide in refinery production, all of whom were employed on one Hampton Roads/York River facility. Statewide in 1972, the labor force participation rate was 40.2 percent.

In base case I the state's total population is anticipated to reach 5,650,000, and total employment is projected to reach 2,376,000. Refinery employment for the state would be the same as for the Hampton Roads/York River area--approximately 700 persons. The state's labor force participation rate is projected to reach 43.2 percent.

In base case II the changes in Virginia's population and employment totals resulting from refinery employment gains are exactly the same as for the Hampton Roads/York River area in that all changes are anticipated there.

square feet of new commercial space.

Major Concerns

Major concerns associated with OCS development in the Onshore Area are:

(1) The possibility of rapid, uncontrolled growth, particularly in the relatively rural Eastern Shore.

(2) Air and water pollution resulting from both directly and indirectly OCS-related industrial development, as well as secondary development.

(3) The demand for large amounts of water which will be required to support any development. Problems in this regard are already projected for the Hampton Roads/York River area, and the Eastern Shore has only limited supplies.

(4) The requirements for increased public services and for increased overhead of local government.

Conclusions

In general, the results of this analytical procedure have some significant impacts likely to occur under these assumptions with the possibility for even greater impacts under different working assumptions. The Eastern Shore, for example, would experience modest population increases and concurrent demands upon social and physical systems. Of possibly greater impact would be the significant shift that could occur from an economy, lifestyle,

TABLE 1.--POSSIBLE HIGH DEVELOPMENT IMPACT OF THE ATLANTIC OUTER CONTINENTAL SHELF ON VIRGINIA'S EASTERN SHORE

	1972	1985				
	Actual	Base Case I[a]	Absolute Change	Base Case II[b]	Absolute Change	OCS Development[c]
Population	43,500	47,200		47,200	5,700	52,900
Labor force (including military)	18,810	19,500		19,500	6,960	26,460
Unemployment	2,175	1,600		1,600	-400	1,200
Total employment (including military)	16,635	17,900		17,900	7,360	25,260
Construction	361	420		420[h]	100	520[h]
Mining						
Oil and gas extraction					1,880	1,880[l]
Other[d]						
Agriculture	3,360	2,500		2,500		2,500
Manufacturing						
Petroleum refining, gas processing and petrochemical						
Other[e]	3,353	5,400		5,400[l]	1,500	6,900[l]
Utilities[f]	509	630		630[i]	100	730[i]
Services[g]	9,052	8,950		8,950[k]	3,680	12,630[k]
Labor force as a percent of population	43.2	41.3		41.3		50.0

a/ Base case one assumes that refinery capacity at the Yorktown refinery will increase by 60 percent to 80,000 barrels per day and that the Suffolk refinery will be built with production of 184,000 barrels per day. Under the base case I assumption, Virginia would have total refinery capacity of 264,000 barrels per day by 1985.

b/ Base case two assumes that refinery capacity at the Yorktown refinery will increase by 100 percent to 100,000 barrels per day and that the Suffolk refinery will be built as outlined in base case I. In addition the Transco refinery in Portsmouth is assumed to be operational with a 200,000 barrel refinery capacity. In base case II an off-shore port facility would be built off the coast of Virginia. Under the base case II assumption, Virginia would have total refinery capacity of 484,000 barrels per day by 1985.

c/ Under the third option, development of Virginia outer continental shelf is assumed. Total refinery production would reach 750,000 barrels per day. In addition to the assumptions made in base case I and base case II, it is assumed that the Yorktown refinery will increase capacity to 150,000 barrels per day, the Suffolk refinery will increase capacity to 300,000 barrels per day and that the Motor Gas, Oil and Refining Corporation will build its Portsmouth facility with a 100,000 barrel per day capacity.

d/ Includes all mining except oil and gas extraction, which is SIC group 13.

e/ Includes all manufacturing except petroleum refining and related industries which is SIC group 29.

f/ Includes all public utilities, transportation, and communications. Presented are SIC categories 40 through 49.

TABLE 1.--POSSIBLE HIGH DEVELOPMENT IMPACT OF THE ATLANTIC OUTER CONTINENTAL SHELF ON VIRGINIA'S EASTERN SHORE (Cont'd)

g/ Includes all employment not mentioned in the above categories. SIC categories 50 through 99 are included here.

h/ Each refinery, gas processing, and petrochemical worker is expected to create employment for one additional construction worker.

i/ Each refinery, gas processing, and petrochemical worker is expected to create employment for one additional utility worker.

j/ Each refinery, gas processing, and petrochemical worker is expected to create two additional other manufacturing jobs.

k/ Each additional "basic industry" type worker is expected to create an additional service or "supporting" type worker.

1/ Represents one half of the east coast exploration, platform development and oil and gas production total estimated to be needed by Resource Planning Associates in order to produce 750,000 barrels of crude oil per day.

Sources: Resource Planning Associates, Inc. "Potential Onshore Effects of Oil and Gas Production on the Atlantic and Gulf of Alaska Outer Continental Shelf," December 1973; Arthur D. Little, Inc., "Potential Onshore Effects of Deepwater Oil Terminal-Related Industrial Development - Report to the Council on Environmental Quality;" United States Department of the Interior,"Environmental Impact Statement: Deepwater Ports," April, 1974; Commonwealth of Virginia, "Off-Shore Port Facilities: Commonwealth of Virginia," February, 1974; and Tetra Tech, Inc., "The Effect of Natural Phenomena on OCS Gas and Oil Development," December, 1973.

TABLE 2.--POSSIBLE HIGH DEVELOPMENT IMPACT OF THE ATLANTIC OUTER CONTINENTAL SHELF ON VIRGINIA'S HAMPTON ROADS AREA

	1972	1985				
	Actual	Base Case I[a]	Absolute Change	Base Case II[b]	Absolute Change	OCS Development[c]
Population	1,044,400	1,244,600	4,000	1,248,600	66,900	1,315,500
Labor force (including military)	514,755	617,693	6,435	624,128	46,760	670,888
Unemployment	11,346	16,953		16,953		16,953
Total employment (including military)	503,409	600,740	6,435	607,175	46,760	653,935
Construction	21,466	27,600	585	28,770[i]	4,300	33,070[i]
Mining						
Oil and gas extraction	-	-			1,880	1,880[m]
Other[d]	57	60		60		60
Agriculture	3,898	2,868		2,686		2,868
Manufacturing						
Petroleum refining, gas processing, and petrochemicals	225	715	585	1,300[h]	4,300	5,600[k]
Other[e]	59,914	83,926	1,170	85,096[k]	8,600	93,696[k]
Utilities[f]	20,749	25,200	585	25,785[i]	4,300	30,085[i]
Federal government	170,520	154,000		154,000		154,000
Services[g]	226,580	306,371	2,925	309,296[l]	23,380	332,676[l]
Labor force as a percent of population	49.3	49.6		50.0		51.0

a/ Base case one assumes that refinery capacity at the Yorktown refinery will increase by 60 percent to 80,000 barrels per day and that the Suffolk refinery will be built with production of 184,000 barrels per day. Under the base case I assumption, Virginia would have total refinery capacity of 264,000 barrels per day by 1985.

b/ Base case two assumes that refinery capacity at the Yorktown refinery will increase by 100 percent to 100,000 barrels per day and that the Suffolk refinery will be built as outlined in base case I. In addition the Transco refinery in Portsmouth is assumed to be operational with a 200,000 barrel refinery capacity. In base case II an off-shore port facility would be built off the coast of Virginia. Under the base case II assumption, Virginia would have total refinery capacity of 484,000 barrels per day by 1985.

c/ Under the third option, development of Virginia outer continental shelf is assumed. Total refinery production would reach 750,000 barrels per day. In addition to the assumptions made in base case I and base case II, it is assumed that the Yorktown refinery will increast capacity to 150,000 barrels per day, the Suffolk refinery will increase capacity to 300,000 barrels per day and that the Motor Gas, Oil and Refining Corporation will build its Portsmouth facility with a 100,000 barrel per day capacity.

d/ Includes all mining except oil and gas extraction, which is SIC group 13.

e/ Includes all manufacturing except petroleum refining and related industries which is SIC group 29.

f/ Includes all public utilities, transportation, and communications. Presented are SIC categories 40 through 49.

TABLE 2.--POSSIBLE HIGH DEVELOPMENT IMPACT OF THE ATLANTIC OUTER CONTINENTAL SHELF ON VIRGINIA'S HAMPTON ROADS AREA (Cont'd)

g/ Includes all employment not mentioned in the above categories. SIC categories 50 through 99 are included here.

h/ It is assumed that 135 refinery workers are required for each 50,000 barrels per day refinery capacity. Thus, with refinery capacity of 484,000 barrels, 1,300 workers would be needed.

i/ Each refinery, gas processing, and petrochemical worker is expected to create employment for one additional construction worker.

j/ Each refinery, gas processing, and petrochemical worker is expected to create employment for one additional utility worker.

k/ Each refinery, gas processing, and petrochemical worker is expected to create two additional other manufacturing jobs.

l/ Each additional "basic industry" type worker is expected to create an additional service or "supporting" type worker.

m/ Represents one fourth of the east coast exploration, platform development and oil and gas production total estimated to be needed by Resource Planning Associates in order to produce 750,000 barrels of crude oil per day.

Sources: Resource Planning Associates, Inc. "Potential Onshore Effects of Oil and Gas Production on the Atlantic and Gulf of Alaska Outer Continental Shelf," December 1973; Arthur D. Little, Inc., "Potential Onshore Effects of Deepwater Oil Terminal-Related Industrial Development - Report to the Council on Environmental Quality;" United States Department of the Interior, "Environmental Impact Statement: Deepwater Ports," April, 1974; Commonwealth of Virginia, "Off-Shore Port Facilities: Commonwealth of Virginia," February, 1974; and Tetra Tech, Inc., "The Effect of Natural Phenomena on OCS Gas and Oil Development," December, 1973.

TABLE 3.--POSSIBLE HIGH DEVELOPMENT IMPACT OF THE ATLANTIC OUTER CONTINENTAL SHELF ON ONSHORE VIRGINIA

	1972	1985				
	Actual	Base Case I[a/]	Absolute Change	Base Case II[b/]	Absolute Change	OCS Development[c/]
Population	4,764,000	5,650,000	4,000	5,654,000	72,600	5,726,600
Labor force (including military)	1,913,300	2,440,000	6,435	2,446,435	54,120	2,500,555
Unemployment	51,700	64,000		64,000		63,600
Total employment (including military)	1,860,000	2,376,000	6,435	2,382,435	54,120	2,436,555
Construction	99,400	126,000	1,170	127,170[i/]	4,400	131,570[i/]
Mining						
Oil and gas extraction	10	25		25	3,760	3,785[m/]
Other[d/]	15,690	19,975		19,975		19,975
Agriculture	73,300	40,000		40,000		40,000
Manufacturing						
Petroleum refining, gas processing and petrochemicals	225	715		1,300[h/]	4,400	5,700[k/]
Other[e/]	375,175	514,285	1,170	515,455[k/]	10,100	525,555[k/]
Utilities[f/]	98,900	125,000	585	125,585	4,400	129,985[i/]
Services[g/]	1,197,300	1,550,000	2,925	1,552,925[l/]	27,060	1,579,985[l/]
Labor force as a percent of population	40.2	43.2		43.3		43.7

a/ Base case one assumes that refinery capacity at the Yorktown refinery will increase by 60 percent to 80,000 barrels per day and that the Suffolk refinery will be built with production of 184,000 barrels per day. Under the base case I assumption, Virginia would have total refinery capacity of 264,000 barrels per day by 1985.

b/ Base case two assumes that refinery capacity at the Yorktown refinery will increase by 100 percent to 100,000 barrels per day and that the Suffolk refinery will be built as outlined in base case I. In addition the Transco refinery in Portsmouth is assumed to be operational with a 200,000 barrel refinery capacity. In base case II an off-shore port facility would be built off the coast of Virginia. Under the base case II assumption, Virginia would have total refinery capacity of 484,000 barrels per day by 1985.

c/ Under the third option, development of Virginia outer continental shelf is assumed. Total refinery production would reach 750,000 barrels per day. In addition to the assumptions made in base case I and base case II, it is assumed that the Yorktown refinery will increase capacity to 150,000 barrels per day, the Suffolk refinery will increase capacity to 300,000 barrels per day and that the Motor Gas, Oil and Refining Corporation will build its Portsmouth facility with a 100,000 barrel per day capacity.

d/ Includes all mining except oil and gas extraction, which is SIC group 13.

e/ Includes all manufacturing except petroleum refining and related industries which is SIC group 29.

f/ Includes all public utilities, transportation, and communications. Presented are SIC categories 40 through 49.

TABLE 3.--POSSIBLE HIGH DEVELOPMENT IMPACT OF THE ATLANTIC OUTER CONTINENTAL SHELF ON ONSHORE VIRGINIA (Con'd)

g/ Includes all employment not mentioned in the above categories. SIC categories 50 through 99 are included here.

h/ It is assumed that 135 refinery workers are required for each 50,000 barrels per day refinery capacity. Thus, with refinery capacity of 484,000 barrels, 1,300 workers would be needed.

i/ Each refinery, gas processing, and petrochemical worker is expected to create employment for one additional construction worker.

j/ Each refinery, gas processing, and petrochemical worker is expected to create employment for one additional utility worker.

k/ Each refinery, gas processing, and petrochemical worker is expected to create two additional other manufacturing jobs.

l/ Each additional "basic industry" type worker is expected to create an additional service or "supporting" type worker.

m/ Represents one half of the east coast exploration, platform development and oil and gas production total estimated to be needed by Resource Planning Associates in order to produce 750,000 barrels of crude oil per day.

Sources: Resource Planning Associates, Inc. "Potential Onshore Effects of Oil and Gas Production on the Atlantic and Gulf of Alaska Outer Continental Shelf," December 1973; Arthur D. Little, Inc., "Potential Onshore Effects of Deepwater Oil Terminal-Related Industrial Development - Report to the Council on Environmental Quality;" United States Department of the Interior, "Environmental Impact Statement: Deepwater Ports," April, 1974; Commonwealth of Virginia, "Off-Shore Port Facilities: Commonwealth of Virginia," February, 1974; and Tetra Tech, Inc., "The Effect of Natural Phenomena on OCS Gas and Oil Development," December, 1973.

TABLE 4.--POSSIBLE 1985 HIGH OCS DEVELOPMENT IMPACTS ON SOCIAL AND PHYSICAL SYSTEMS: VIRGINIA, HAMPTON ROADS, AND EASTERN SHORE

	Virginia	Hampton Roads	Eastern Shore
Population (absolute change over Base Case II)	72,600	66,900	5,700
Social Systems[a/]			
School enrollment[b/]	19,058	17,561	1,496
Hospital beds[c/]	265	244	21
Police manpower[d/]	112	103	9
Government overhead[e/]	$546,678	$503,757	$42,921
Government employees[f/]	2,178	2,007	171
Physical Systems			
Water demands (million gallons per day)[g/]			
domestic	7.26	6.69	.57
petroleum related industry[h/]	.78+	78	.03
Sewage - domestic (million gallons per day)	7.26	6.69	.57
Solid waste (tons per day)[i/]	218+	201	17
Residential structures[j/]	24,200	22,300	1,900
Commercial structures (square feet)[k/]	1,778,700	1,639,050	139,650

a/ Ratios used to generate figures for the ten social and physical system indicators from 1985 population figures are in some cases the averages of similar ratios for four east coast hypothetical case studies done by Resource Planning Associates for the Council on Environmental Quality. These case study locations are Bristol County, Massachusetts, Cumberland/Cape May Counties, New Jersey, Charleston, South Caroline, and Jacksonville, Florida. Other ratios are commonly accepted ones for Virginia supplied by the State Water Control Board and the Division of State Planning and Community Affairs where significantly different from RPA figures.

b/ School enrollment is assumed to be .2625 the total population, based on RPA figures.

c/ Demand for hospital beds is assumed to be 3.64 per thousand population based on RPA figures.

d/ It is assumed that 1.54 additional police persons will be required for each 1,000 persons based on RPA figures.

e/ Local government overhead cost is estimated at $7.53 per person based on RPA figures.

f/ A ratio of 30 government employees per thousand population is assumed based on DSPCA figures for Virginia.

g/ A domestic water demand and sewage discharge of 100 gallons per person per day is assumed based on SWCB estimates for Virginia.

h/ Petroleum industry water demand figures are based on assumptions of 40 gallons per barrel for refineries, 15,000 gpd per gas processing plant, and 24 mgd per major petrochemical complex from RPA sources.

i/ Solid waste is assumed to be generated at 3 tons per thousand persons per day based on SWCB Virginia estimates.

j/ Residential structure figures are calculated at a ratio of 3.0 persons per household based on DSPCA-Virginia figures.

k/ Commercial structure requirements are assumed to be 24.5 square feet per person based on RPA figures.

VI

Recommendations

This section will set forth recommendations based upon the preceeding portions of this report. Their ultimate aim is to enable Virginia to derive maximum benefit from whatever resources may be discovered on the OCS, while preserving to the greatest possible extent the environment which so enhances our daily lives. In fact, given the energy requirements of the United States, we feel they will likely be developed whether or not we as Virginians desire it, regardless of the decision of the Supreme Court with respect to ownership of the offshore lands. It therefore behooves us to make arrangements to anticipate the effects of OCS development and its associated problems.

In order, therefore, to prepare for the possibility of the development of the OCS off the coast of our state, we make the following recommendations:

Overall Recommendations

(1) Virginia is currently involved in the development of a Coastal Zone Management Plan. It is recommended that this planning effort consider the possibility of OCS oil and gas exploration and exploitation, including the findings of this and any subsequent reports.

(3) The Atlantic Coastal States should oppose drilling on OCS lands until an oil spill cleanup association organized in the fashion of "Clean Gulf Associates" has been formed for the Atlantic area by the oil companies who desire to exploit the Atlantic OCS. This association should be capable of employing "state of the art" technology in its clean-up activities.

(4) Research problems concerning hydrocarbons and the marine environment should be jointly attacked by the Atlantic Coastal States and the Federal Government in order to prevent needless duplication. Virginia should develop an adequate offshore research and monitoring capability to support these studies. Though it is impossible to list here all of the programs which should be scientifically pursued in this regard, the following general topics are considered to be the most important:

   (a) Baseline studies to establish current conditions among the biota, particularly those of the offshore area.

   (b) Response of the various organisms to chronic long term releases of small amounts of petroleum.

   (c) Surface and bottom current patterns in the

the development of the OCS.

Recommendations for the Offshore Area

If Virginia should be awarded control of the offshore area, the following recommendations apply:

(1) Regulations similar to those in current use by the Federal Government should be adopted by Virginia to cover all phases of leasing, exploration, production, and inspection of the OCS lands and operations. These should include the control of drilling by-products such as bleedwater drill cuttings and drilling mud.

(2) A state agency should be assigned responsibility for the OCS lands in the Offshore area. The Virginia Marine Resources Commission would be a logical choice; however, VMRC would have to be very greatly expanded, since the magnitude of OCS activities it would oversee would be enormous. Alternatively, a new agency, properly funded, staffed and equipped could be formed and assigned the responsibility, together with the broad powers required.

In either case, close liaison should be established with other state agencies having an interest in the marine environment and its resources, notably the Virginia Institute of Marine Science, the State Water Control Board,

vice regarding massive wetlands alterations as well as surveillance of such activities should be provided local governments by appropriate state agencies such as the Virginia Institute of Marine Science and the Virginia Marine Resources Commission.

(2) Detailed criteria should be developed to be utilized in the approval of permits for the placing of structures (including pipelines) in the marine environment. Methods of construction, route selection, operational monitoring and requirements for removal upon obsolescence should be included. A detailed study should be made of problems encountered in states where offshore activity has been going on (such as Louisiana and California) and the procedures developed to handle them.

(3) Pipeline access through the Interface area should be so controlled that the numbers of pipeline corridors will be kept to a minimum.

Recommendations for the Onshore Area

(1) Local governments who are expected to bear the impact of onshore development should be encouraged with state assistance to plan for and regulate projected growth in their areas, in order that they may derive maximum benefit from such growth at the least possible expense

Appendix A

U.S. v. Maine, et al

In 1969 the State of Maine granted exclusive exploratory rights in certain tracts of offshore lands beyond the three-mile limit to King Resources. The United States thereupon brought suit against the 13 Atlantic Coastal States for a determination of rights in all the lands and natural resources of the bed of the Atlantic Ocean more than three geographical miles from the coastline. The federal action, in a word, is in the nature of a suit to quiet title.

The coastal states, in response to the complaint of the United States, denied the allegations and, by way of affirmative defense, alleged that they as successors in title to certain grantees of the Crown of England are now and - ever since the formation of the Union - have been entitled to exercise exclusive dominion and control over the exploration and development of such natural resources as may be found in, on or about the seabed and subsoil underlying the Atlantic Ocean adjacent to their coastlines. The States also asserted that such power of control is not prohibited by the Constitution, has never been delegated by the States to the federal government and that any attempt by the government to assert such power violates the provisions of the Tenth Amendment to the Constitution.

After the initial pleadings had been filed, the United States moved for judgment on the pleadings; the States,

coastal states' ownership of the bed of the three-mile territorial sea adjacent to their coastal lines while at the same time reasserting the federal claim to resources seaward of the three-mile limit, subject to coastal states proving claims to limits beyond the three-mile limit.

The basic contentions of the defendant states are several:

(1) That under the law and practice of England prior to and during the 17th and 18th centuries, the seabed comprising the continental shelf of England and of English possessions was subject to an exclusive right of exploitation in favor of the English Crown.

(2) In that period no generally recognized principle of international law prohibited or denied that exclusive right to the English Crown.

(3) During the period 1492 to 1776, England acquired by right of discovery or conquest and the performance of symbolic acts of sovereignty over the territories now comprising the defendant states and the adjacent continental shelf. During that period the Crown granted its right of exploitation over part or all of that continental shelf to Colonial proprietorships and governments. For example, the States assert that the 1607 and 1609

Thus, the legal lines are drawn in the latest and, perhaps, the last of the big offshore lands cases. Much is at stake; the case is expected to be argued in February, 1975, with a decision to be announced by June.